

While this “election” approach may be effective in classifying individual LECs with respect to their respective productivity expectations, it effectively vitiates the sharing requirement. LECs that anticipate above-average performance and productivity growth will elect the highest X-factor, but will thereby escape any further sharing obligation. LECs with low productivity and earnings expectations will elect the lowest X-factor but, since they are by definition those with low earnings results, they will not be required to share anything as a practical matter despite the nominal obligation to do so under the low X-factor election that they may have made. Indeed, as formulated in the First Report and Order, the only condition under which any sharing will realistically take place is where the LEC has erred in its own earnings forecast, and then only with respect to those LECs that had forecast low earnings to begin with.

4% Option		4.7% Option		5.3% Option
<u>Before Sharing</u>	<u>After Sharing</u>	<u>Before Sharing</u>	<u>After Sharing</u>	<u>No Sharing</u>
12.00	<b>12.00</b>	11.70	11.70	11.45
12.25	<b>12.25</b>	11.95	11.95	11.70
12.75	<b>12.50</b>	12.45	12.35	12.20
13.05	<b>12.65</b>	12.75	12.50	12.50
13.25	<b>12.75</b>	12.95	12.60	12.70
13.75	12.75	13.45	12.85	<b>13.20</b>
14.25	12.75	13.95	13.10	<b>13.70</b>
14.75	12.75	14.45	13.35	<b>14.20</b>
15.25	12.75	14.95	13.60	<b>14.70</b>
15.75	12.75	15.45	13.85	<b>15.20</b>
16.25	12.75	15.95	14.10	<b>15.70</b>
16.75	12.75	16.45	14.25	<b>16.20</b>
17.00	12.75	16.70	14.25	<b>16.45</b>

In fact, the LEC will be confronted with an unambiguous choice of X-factor based upon its projected level of interstate earnings, as summarized in the following table calculated on the basis of Pacific Bell’s interstate revenues and rate base as a example. As shown in Table 6 below, for earnings levels below 13.25%, the correct choice is the 4.0% X-factor (which would permit Pacific to earn 12.75% after sharing); for earnings levels in excess of this amount, the correct choice is the 5.3% option. As it turns out, there is no level of earnings at which the 4.7% choice that was offered to the LECs in the *First Report and Order* would be selected. Significantly, assuming that the correct election is made and that earnings levels have been correctly forecast, no sharing will take place under any of the three X-factor alternatives offered by the Commission in the current price cap system.

In fact, all that the present system does is to encourage LECs to engage in “gaming” of the regulatory system itself. Because elections are to be made on an annual basis, it is a relatively simple matter for the LEC to both forecast its earnings levels and to take remedial

accounting steps during the course of the one-year period to ensure that its choice is borne out. For example, it would be entirely possible for a LEC to deliberately select the 4.0%, maximum sharing alternative in a year in which it undertakes significant capital spending and plant retirements, then elect the 5.3%, no-sharing choice for the subsequent year, during which such spending and retirements can be deferred. By flipping between the no-sharing/maximum-sharing choices, the LEC can achieve consistent excess earnings over successive two-year periods while never having to share any of those excess earnings with ratepayers.

To a significant extent, the presence of a range of X-factor options also contravenes the foundational price cap goal of de-linking rates from costs. As initially envisioned, the X-factor was to represent some sort of “standard” or “target” benchmark. LECs that outperformed the benchmark would be rewarded; those falling short of it would be punished. By offering low-performance LECs the opportunity to select and operate under a lower-than-average X-factor, that “punishment” is substantially diminished.

**A moving average that does not realistically reflect technical diffusion as would be characterized in a competitive market environment does not provide an effective substitute for sharing.**

USTA has proposed, in lieu of a sharing mechanism, that the X-factor be revised on an annual basis to reflect changes in the LEC TFP growth rate that may occur from time to time. The salient features of the USTA plan can be summarized as follows:

- The X-factor would be subject to an annual adjustment based upon a five-year moving average LEC TFP with a two-year lag. Thus, the X factor that would become applicable in 1995 would be based upon the average LEC TFP calculated for the period 1988-1992, the X Factor that would become applicable in 1996 would be based upon the average LEC TFP calculated for the period 1989-1993, etc.<sup>172</sup>
- The X-factor itself would be set equal to the *differential* between the moving average LEC TFP and the moving average economy-wide TFP calculated over the same five-year period with a two-year lag.
- Initially, LECs electing to adopt the USTA plan would be required to reduce their price cap index (PCI) for the year of the election by 1%. Subsequent annual changes in the PCI would use the election-year PCI as a base. No other reinitial-

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172. “A USTA Proposal for the LEC Price Cap Plan”, FCC CC Docket No. 94-1, January 18, 1995, “USTA January 1995 Proposal”, Attachment 1, at page 1, note 1.

ization of rates would be required.

- Sharing would be totally eliminated. However, in the initial year in which the USTA option is offered, the Consumer Productivity Dividend (CPD) would be increased to 1%, would be set at 0.5% in the second year, 0.25% in the third year, and be phased out altogether thereafter. Note that the CPD phase-out runs from the adoption of the USTA plan by the FCC, not from the date of its election by any individual LEC. LECs would be permitted to elect the USTA plan at any time following the date of its adoption by the Commission, and would be subject to the then-existing CPD. Once elected, reversion to the current plan would not be permitted.

In advancing this proposal, USTA concedes that, in competitive markets, productivity gains achieved by individual firms are ultimately flowed through to consumers. In competitive markets, when one firm initiates the use of a new production technique or technology that results in reduced costs and/or in product improvements, its rivals will ultimately mimic that initiative and in so doing bid down prices to reflect the new cost conditions. Indeed, in competitive markets, firms that are not able to mimic their more efficient rivals will be forced out of the market altogether.

While LECs often complain that under rate of return regulation they are forced to “give back” their efficiency gains in the form of rate reductions, this outcome is in actuality not unlike the conditions that prevail in competitive markets. Indeed, to the extent that price cap regulation may permit LECs to *retain* the benefits of productivity improvements for an extended period of time (for example, if there is no sharing requirement), it is possible that price cap regulation may produce results that are even more removed from the “competitive outcome” objective of economic regulation than has traditionally occurred under RORR.

Of course, while the *theory* of competitive market behavior holds that productivity gains are eventually flowed through to consumers, it provides little direct guidance as to precisely how quickly this will occur. In some cases, innovations may be retained for extended periods of time. For example, if the new technique is covered by one or more patents, the competitive advantage can persist for the life of the patent. Pharmaceutical companies, for example, have been able to retain proprietary rights over new drugs until the governing patents run out. When a number of firms both possess essentially similar technologies and, more importantly, are actively engaged in research, development, and innovation of their own, gains achieved by one firm may be short-lived indeed. In technologically volatile industries such as computers and telecommunications equipment, productivity gains can be exploited for very short periods of time (perhaps on the order of months), because any of a number of firms can readily replicate the new technique, product design, or other

innovation to which the competitive marketplace has been subjected.<sup>173</sup>

USTA is proposing that the X-factor be revised annually based upon a five-year moving average of the LEC TFP (calculated using the Christensen methodology) and that the result be lagged by an additional two years. Thus, the X-factor applicable for the July, 1996 price cap adjustment date would, under this schedule, be based upon the average LEC TFP for the period 1989-93. Put another way, any productivity improvement that occurred in 1995 would not be fully captured in the X-factor until the year 2002. USTA has offered no credible basis for this protracted period of diffusion, nor could it, because USTA's plan does not come remotely close to mirroring the behavior of competitive, technology-impacted markets.

Under the USTA moving average TFP proposal, shareholders, rather than customers, are permitted to capture and retain most of the productivity gains that the price cap LECs will enjoy. The USTA proposal is thus not a substitute for sharing or for a CPD, and must be rejected.

**A moving average based upon a misspecified X-factor does not provide an effective substitute for sharing.**

Even if there were merit in the five-year moving average TFP approach that USTA has advanced (which, as we have shown, there is not), one of the basic premises upon which the USTA plan is predicated is demonstrably false. USTA contends that the annual TFP recalculation process will be straightforward and uncontroversial because "[m]ost of the data are either taken directly from public sources or derived from them."<sup>174</sup> As we have shown, and as Dr. Christensen's testimony in California has confirmed, USTA's characterizations of the computational methods and data sources are anything but simple and straightforward. As discussed in Section 2 of this report, the data underlying the Christensen TFP model are not taken from public sources, but are instead derived from internal LEC data much of which is claimed to be proprietary. The full methodology is not documented, in that extensive data analysis and data reduction occurred within the individual USTA member companies the details of which were not even known to Dr. Christensen.

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173. Although a difficult area to test empirically, research on the relationship of market structure to innovative activity and technology diffusion suggests that an increasingly competitive telecommunications market will hasten the rate of both phenomena. See, e.g., P. A. Geroski, "Innovation, Technological Opportunity, and Market Structure," *Oxford Economic Papers*, Vol. 42, (1990), pp. 586-602.; Romeo, A. A., "The Rate of Imitation of a Capital-Embodied Process Innovation," *Economica*, Vol. 44, (1977), pp. 63-69.; Edwin Mansfield, "Technical Change and the Rate of Imitation," *Econometrica*, Vol. 29, No. 4, (October 1961).

174. USTA January 18, 1995 *ex parte*, Attachment 1, p. 2. Emphasis supplied.

### *Implementation of the Permanent X-factor*

The data and methodological deficiencies we have identified herein make the Christensen TFP study and study process not useful even for purposes of calculating a single TFP subject to examination in a contested rulemaking proceeding; it could not therefore even remotely be considered acceptable for a “mechanical” annual updating process such as envisioned under USTA’s proposal.

## **Appendix A**

# **ECONOMIC DEPRECIATION RATES: BUSINESS ASSETS**

Source: D.W. Jorgenson, "Productivity and Economic Growth," in *Fifty Years of Economic Measurement*, (E.R. Berndt and J.E. Triplett, eds., 1990), Table 3.6., page 45. (Jorgenson).

Table 3.6 Economic Depreciation Rates: Business Assets

Assets	Old Lifetime	Old Depreciation Rate	New Lifetime	New Depreciation Rate
1. Household furniture & fixtures	15	.1100	12	.1375
2. Other furniture	15	.1100	14	.1179
3. Fabricated metal products	18	.0917	18	.0917
4. Steam engines & turbines	21	.0786	32	.0516
5. Internal combustion engines	21	.0786	8	.2063
6. Farm tractors	8	.1633	9	.1452
7. Construction tractors	8	.1633	8	.1633
8. Agricultural machinery	17	.0971	14	.1179
9. Construction machinery	9	.1722	10	.1722
10. Mining & oilfield machinery	10	.1650	11	.1500
11. Metalworking machinery	16	.1225	16	.1225
12. Special industry machinery	16	.1031	16	.1031
13. General industrial	14	.1225	16	.1225
14. Office, computing	8	.2729	8	.2729
15. Service industry machinery	10	.1650	10	.1650
16. Communication equipment	14	.1179	15	.1100
17. Electrical transmission	14	.1179	33	.0500
18. Household appliances	14	.1179	10	.1651
19. Other electrical equipment	14	.1179	9	.1834
20. Trucks, buses, & truck trailers	9	.2537	9	.2537
21. Autos	10	.3333	10	.3333
22. Aircraft	16	.1833	16	.1833
23. Ships & boats	22	.0750	27	.0611
24. Railroad equipment	25	.0660	30	.0550
25. Scientific & engineering instruments	11	.1473	12	.1350
26. Photocopy & related equipment	11	.1473	9	.1800
27. Other nonresidential equipment	11	.1473	11	.1473
28. Industrial buildings	27	.0361	31	.0361
29. Mobile offices	36	.0247	16	.0556
30. Office buildings	36	.0247	36	.0247
31. Commercial warehouses	36	.0247	40	.0222
32. Other commercial buildings	36	.0247	34	.0262
33. Religious buildings	48	.0188	48	.0188
34. Educational buildings	48	.0188	48	.0188
35. Hospital & institutional buildings	48	.0233	48	.0233
36. Hotels & motels	40	.0247	32	.0247
37. Amusement & recreational	31	.0454	30	.0469
38. Other nonfarm buildings	31	.0454	38	.0370
39. Railroad structures	51	.0176	54	.0166
40. Telephone & telegraph structures	27	.0333	40	.0225
41. Electric light & power structures	30	.0300	40	.0225
42. Gas structures	30	.0300	40	.0225
43. Local transit	26	.0450	38	.0450
44. Petroleum pipelines	26	.0450	40	.0450
45. Farm structures	38	.0237	38	.0237
46. Petroleum & natural gas	16	.0563	16	.0563
47. Other mining exploration	16	.0563	16	.0563
48. Other nonresidential structures	31	.0290	40	.0225
49. Railroad replacement track	51	.0176	38	.0236
50. Nuclear fuel	—	—	6	.2500
51. Residential structures	—	.0130	—	.0130

Source: Jorgenson and Yun (1990), table 13B, p. 82.

Table B3  
Restatement of BLS Data to 1984 Base Year

**Office, Computing and  
Accounting Machinery  
(PA14)**

Year	Original BLS Data	BLS Data Restated to 1984 Base Year
1984	1.675	1.000
1985	1.276	0.762
1986	1.104	0.659
1987	1.000	0.597
1988	0.899	0.537
1989	0.880	0.525
1990	0.788	0.470
1991	0.682	0.407
1992	0.590	0.352
1993	0.510	0.304

**Communications  
Equipment  
(PA16)**

Year	Original BLS Data	BLS Data Restated to 1984 Base Year
1984	0.925	1.000
1985	0.945	1.022
1986	0.969	1.048
1987	1.000	1.081
1988	1.028	1.111
1989	1.009	1.091
1990	1.020	1.103
1991	1.033	1.117
1992	1.045	1.130
1993	1.061	1.147

**Autos  
(PA21)**

Year	Original BLS Data	BLS Data Restated to 1984 Base Year
1984	0.897	1.000
1985	0.926	1.032
1986	0.965	1.076
1987	1.000	1.115
1988	1.020	1.137
1989	1.040	1.159
1990	1.056	1.177
1991	1.093	1.219
1992	1.120	1.249
1993	1.148	1.280

**Aircraft  
(PA22)**

Year	Original BLS Data	BLS Data Restated to 1984 Base Year
1984	0.978	1.000
1985	0.972	0.994
1986	0.980	1.002
1987	1.000	1.022
1988	1.014	1.037
1989	1.074	1.098
1990	1.130	1.155
1991	1.196	1.223
1992	1.245	1.273
1993	1.274	1.303

**Other Nonresidential  
Equipment  
(PA27)**

Year	Original BLS Data	BLS Data Restated to 1984 Base Year
1984	0.936	1.000
1985	0.961	1.027
1986	0.979	1.046
1987	1.000	1.068
1988	1.038	1.109
1989	1.074	1.147
1990	1.110	1.186
1991	1.136	1.214
1992	1.148	1.226
1993	1.168	1.248

**Telecommunications  
Structures  
(PA40)**

Year	Original BLS Data	BLS Data Restated to 1984 Base Year
1984	0.990	1.000
1985	1.010	1.020
1986	1.000	1.010
1987	1.000	1.010
1988	1.010	1.020
1989	1.100	1.111
1990	1.130	1.141
1991	1.140	1.152
1992	1.140	1.152
1993	1.183	1.195



Table B2

## Derivation of BEA / BLS-based Asset Deflator for Christensen General Support Category

## Step 1.

Costs of Assets included in SOCC General Support Category  
(Amounts Shown in Thousands)

SOCC Acct #	Account Title	Cost	Share of Total Cost
2111	Land	988,979	3.09%
2112	Motor Vehicles	1,844,265	5.76%
2113	Aircraft	49,512	0.15%
2114	Special Purpose Vehicles	3,159	0.01%
2115	Garage Work Equipment	99,554	0.31%
2116	Other Work Equipment	1,522,267	4.76%
2121	Buildings	16,308,417	50.94%
2122	Furniture	693,005	2.16%
2123	Office Equipment	1,778,600	5.56%
2124	General Computers	8,724,229	27.25%
2110	Total	32,011,987	100.00%

## Step 2.

Share of Costs of Different BEA / BLS Asset Categories with  
Respect to Total Cost of SOCC General Support Category

BEA	SOCC	Account Title	Share of Total Cost
PA 14	2124	General Computers	27.25%
		Office, Computing and Accounting Machinery	27.25%
PA 27	2116	Office Equip	5.56%
		Garage Work Equip	0.31%
		Other Work Equip	4.76%
		Other Nonresidential Equip.	10.62%
PA 21	2114	Motor Vehicles	5.76%
		Special Purpose Vehicles	0.01%
		Autos	5.77%
PA 22	2113	Aircraft	0.15%
		Aircraft	0.15%
PA 40	2111	Land	3.09%
		Buildings	50.94%
		Furniture	2.16%
		TeleStructures	56.20%
	2110	Total	100.00%

## Step 3.

Original BEA / BLS Data and SOCC-based Cost Share Data Used for  
Derivation of Asset Deflator Index for General Support Category

BEA Asset Categories Share of Total Cost	PA14	PA27	PA21	PA22	PA40
	0.273	0.106	0.058	0.002	0.562
1984	1.675	0.936	0.897	0.978	0.990
1985	1.276	0.961	0.926	0.972	1.010
1986	1.104	0.979	0.965	0.980	1.000
1987	1.000	1.000	1.000	1.000	1.000
1988	0.899	1.038	1.020	1.014	1.010
1989	0.880	1.074	1.040	1.074	1.100
1990	0.788	1.110	1.056	1.130	1.130
1991	0.682	1.136	1.093	1.196	1.140
1992	0.590	1.148	1.120	1.245	1.140
1993	0.510	1.168	1.148	1.274	1.183

## Step 4.

## Derivation of Asset Deflator Index for General Support Category

Year	PA14 x Cost Share	PA27 x Cost Share	PA21 x Cost Share	PA22 x Cost Share	PA40 x Cost Share	Derived BLS-based Index	Index Restated to 1984 Base Year
1984	0.456	0.099	0.052	0.001	0.556	1.165	1.000
1985	0.348	0.102	0.053	0.001	0.568	1.072	0.920
1986	0.301	0.104	0.056	0.001	0.562	1.024	0.879
1987	0.273	0.106	0.058	0.002	0.562	1.000	0.858
1988	0.245	0.110	0.059	0.002	0.568	0.983	0.844
1989	0.240	0.114	0.060	0.002	0.618	1.034	0.887
1990	0.215	0.118	0.061	0.002	0.635	1.030	0.884
1991	0.186	0.121	0.063	0.002	0.641	1.012	0.868
1992	0.161	0.122	0.065	0.002	0.641	0.990	0.849
1993	0.139	0.124	0.066	0.002	0.665	0.996	0.855

## Source:

(1) Statistics of Communications Common Carriers ("SOCC"),  
Federal Communications Committee, July 7, 1995.

(2) BEA Asset Price Deflators, Unpublished BLS Data used for  
U.S. Department of Labor News Release, USDL 95-48, February 14, 1995.

Table B1  
Mapping of TPIs and BEA / BLS Asset Deflators

Year	Christensen		BEA / BLS	
	General Support		Weighted Average of Other Nonresidential Equip., Autos, Computers, Aircraft & Buildings <sup>1</sup>	
	TPI	% Change	Asset Deflator Index	% Change
1984	1.000		1.000	
1985	0.993	-0.7%	0.920	-8.3%
1986	0.974	-1.9%	0.879	-4.6%
1987	0.987	1.3%	0.858	-2.4%
1988	1.013	2.6%	0.844	-1.7%
1989	1.003	-1.0%	0.887	5.0%
1990	0.988	-1.5%	0.884	-0.3%
1991	0.905	-8.8%	0.868	-1.8%
1992	0.843	-7.1%	0.849	-2.2%
1993	0.803	-4.9%	0.855	0.6%

Year	Christensen		BEA / BLS	
	Central Office		Communications Equipment <sup>2</sup> (PA16)	
	TPI	% Change	Asset Deflator Index	% Change
1984	1.000		1.000	
1985	0.995	-0.5%	1.022	2.1%
1986	0.972	-2.3%	1.048	2.5%
1987	0.981	0.9%	1.081	3.1%
1988	0.964	-1.7%	1.111	2.8%
1989	0.965	0.1%	1.091	-1.9%
1990	0.967	0.2%	1.103	1.1%
1991	0.955	-1.2%	1.117	1.3%
1992	0.927	-3.0%	1.130	1.2%
1993	0.955	3.0%	1.147	1.5%

Year	Christensen		BEA / BLS	
	Transmission		Communications Equipment <sup>2</sup> (PA16)	
	TPI	% Change	Asset Deflator Index	% Change
1984	1.000		1.000	
1985	1.048	4.7%	1.022	2.1%
1986	1.066	1.7%	1.048	2.5%
1987	1.074	0.7%	1.081	3.1%
1988	1.036	-3.6%	1.111	2.8%
1989	1.053	1.6%	1.091	-1.9%
1990	1.064	1.0%	1.103	1.1%
1991	1.080	1.5%	1.117	1.3%
1992	1.074	-0.6%	1.130	1.2%
1993	1.097	2.1%	1.147	1.5%

Year	Christensen		BEA / BLS	
	Information Orig./Term.		Communications Equipment <sup>2</sup> (PA16)	
	TPI	% Change	Asset Deflator Index	% Change
1984	1.000		1.000	
1985	1.041	4.0%	1.022	2.1%
1986	1.072	2.9%	1.048	2.5%
1987	1.054	-1.7%	1.081	3.1%
1988	1.074	1.9%	1.111	2.8%
1989	1.096	2.0%	1.091	-1.9%
1990	1.105	0.8%	1.103	1.1%
1991	1.103	-0.2%	1.117	1.3%
1992	1.094	-0.8%	1.130	1.2%
1993	1.122	2.5%	1.147	1.5%

Year	Christensen		BEA / BLS	
	Cable and Wire		Telecommunications Structures <sup>2</sup> (PA40)	
	TPI	% Change	Asset Deflator Index	% Change
1984	1.000		1.000	
1985	1.012	1.2%	1.020	2.0%
1986	1.014	0.2%	1.010	-1.0%
1987	1.020	0.6%	1.010	0.0%
1988	1.070	4.8%	1.020	1.0%
1989	1.134	5.8%	1.111	8.5%
1990	1.138	0.4%	1.141	2.7%
1991	1.155	1.5%	1.152	0.9%
1992	1.145	-0.9%	1.152	0.0%
1993	1.145	0.0%	1.195	3.7%

Year	Christensen		BEA / BLS	
	Buildings		Telecommunications Structures <sup>2</sup> (PA40)	
	TPI	% Change	Asset Deflator Index	% Change
1984	1.000		1.000	
1985	1.028	2.8%	1.020	2.0%
1986	1.054	2.5%	1.010	-1.0%
1987	1.076	2.1%	1.010	0.0%
1988	1.115	3.6%	1.020	1.0%
1989	1.139	2.1%	1.111	8.5%
1990	1.179	3.5%	1.141	2.7%
1991	1.211	2.7%	1.152	0.9%
1992	1.241	2.4%	1.152	0.0%
1993	1.287	3.6%	1.195	3.7%

Notes:

(1) See Appendix 3 at p 2 for Derivation of Asset Deflator Index.

(2) All BLS Data is restated to 1984 as a Base Year. See Appendix 3, at p 3.

Sources:

(1) Christensen Data: Productivity of the Local Operating Telephone Companies Subject to Price Cap Regulation - 1993 Update, Laurits R. Christensen, Philip E. Schoech and Mark E. Meitzen, Christensen Associates, January 16, 1995.

(2) BEA Asset Price Deflators, Unpublished BLS Data used for U.S. Department of Labor News Release, USDL 95-48, February 14, 1995. Data is restated to 1984 as base year. See Appendix 3 at pp 2,3.

## **Appendix B**

# **COMPARISON OF TPIS USED IN THE CHRISTENSEN STUDY WITH BEA/BLS ASSET DEFLATORS**

Table B1	Mapping of TPIS and BEA/BLS Asset Deflators
Table B2	Derivation of BEA/BLS-based Asset Deflator for Christensen General Support Category
Table B3	Restatement of Original BLS Data to 1984 Base Year

B



# **REPLY TO X-FACTOR PROPOSALS FOR THE FCC LONG-TERM LEC PRICE CAP PLAN**

Price Cap Performance Review for  
Local Exchange Carriers

CC Docket 94-1

Lee L. Selwyn  
Patricia D. Kravtin

prepared for the

**Ad Hoc Telecommunications Users Committee**

March 1, 1996



**ECONOMICS AND TECHNOLOGY, INC.**

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# **REPLY TO X-FACTOR PROPOSALS FOR THE FCC LONG-TERM LEC PRICE CAP PLAN**

Price Cap Performance Review for  
Local Exchange Carriers

CC Docket 94-1

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prepared for the

**Ad Hoc Telecommunications Users Committee**

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## Preface

## REPLY TO X-FACTOR PROPOSALS FOR THE FCC LONG-TERM LEC PRICE CAP PLAN

In its *Fourth Further Notice of Proposed Rulemaking* (FFNPRM) issued September 27, 1995 in the Commission's Price Cap Review proceeding (CC Docket 94-1), the Commission sought further comment on a broad range of issues relating to the establishment of a long-term price cap plan. The Ad Hoc Telecommunications Users Committee (Ad Hoc Committee) commissioned Economics and Technology, Inc. (ETI) to prepare a report to address the specific issues raised in the FFNPRM, with emphasis on those issues concerning the Christensen/USTA TFP model and its application to the establishment of a permanent X factor. That report, entitled *Establishing the X-Factor for the FCC Long-Term LEC Price Cap Plan* (ETI Report), was submitted as part of the Ad Hoc Committee's initial comments, filed January 16, 1996. In this report, ETI presents its reply to X-Factor proposals submitted by USTA and others in their initial comments, with similar emphasis on those issues concerning the Christensen/USTA TFP model.

The authors are President and Vice President—Senior Economist, respectively, at ETI. They gratefully acknowledge the invaluable advice and assistance contributed by Dr. Ernst R. Berndt, Professor of Applied Economics at the Alfred P. Sloan School of Management, Massachusetts Institute of Technology, in the preparation of this report. Research and analytical support was provided by Jennifer L. Gray, Sonia N. Jorge, and Irena V. Tunkel of ETI.

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# 1

## INTRODUCTION AND SUMMARY

### Purpose of this Report

In our report, *Establishing the X-Factor for the FCC Long-Term LEC Price Cap Plan* submitted earlier in this proceeding in conjunction with the initial comments of the Ad Hoc Telecommunications Committee in response to the Commission's *Fourth Further Notice of Proposed Rulemaking* (FFNPRM), we emphasized the importance of an input price adjustment and further refined the measurement of input price changes to reflect measures of price movements publicly available from disinterested sources as well as hedonic adjustments to the nominal price changes. In addition, that report emphasized the necessity of developing an interstate-only TFP measure, rather than one based upon total company operations. The earlier report also highlighted a number of other methodological deficiencies in the Christensen/USTA study including the failure to recognize the distinction between debt and equity in the application of taxes as part of the rental price formula; the failure to apply depreciation rates that reflect the fundamental economic conditions of capital recovery for the LECs; and the failure to use direct, quantity-based measures of output. Our analysis demonstrated that, when the necessary corrections of the various deficiencies were made to the Christensen/USTA study, the correct X-Factor (including the input price differential and a modest 0.5% Consumer Productivity Dividend) is 9.9% for jurisdictionally interstate services.

In this report, ETI presents its reply to X-Factor proposals submitted by USTA and other parties in their initial comments, with similar emphasis on those issues concerning the Christensen/USTA TFP model. ETI responds in particular to the new Christensen study sponsored by USTA in this proceeding, entitled *Total Factor Productivity Methods for Local Exchange Carrier Price Cap Plans*, provided as Attachment A to USTA's January 16, 1996 comments.<sup>1</sup> This new study is referred to by USTA, and hereafter in this report, as Christensen's "simplified" study. Both Christensen's original study filed May, 1984, and Christensen's 1993 Update Study, filed January, 1995, are hereafter referred to collectively

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1. The new Christensen study was also attached to the individual LEC comments filed by NYNEX and US WEST.

as Christensen's "original" study. ETI also responds to the statistical analyses proffered by other economic experts on behalf of USTA and individual LEC clients, including National Economic Research Associates, Inc. (NERA) (for USTA), Dr. Mel Fuss (for Bell Atlantic), and Dr. Gregory Duncan (for GTE), and by Lincoln Telephone.

## **Summary**

In the FFNPRM, the Commission sets forth three basic criteria that should be satisfied by any X-factor that is ultimately adopted for a long-term price cap plan:

- (1) The X-factor must be economically meaningful;
- (2) The X-factor should ensure that ongoing gains by the LECs in reducing unit costs are passed through to consumers; and
- (3) The calculation of the X-factor should be reasonably simple and be based upon accessible and verifiable data.<sup>2</sup>

As explained in our earlier report, the original Christensen/USTA study was totally deficient with respect to each of these three standards.

USTA has now submitted a new Christensen study that it characterizes as the "simplified" Christensen study. The new "simplified" study does offer an improvement relative to criterion (3) in that it substitutes publicly available data for proprietary LEC data. However, notwithstanding these improvements relating to the use of publicly available data, the new "simplified" Christensen/USTA study remains deficient with respect to the Commission's empirical requirements. In particular, USTA has failed to provide the data and in the form "*necessary to replicate the results submitted in this proceeding*" as required under Paragraph 15, at least within the timeframe of the proceeding. USTA's failure to provide the data necessary to allow replication of *all* results submitted by USTA in this proceeding (as opposed to just the subset of results selected by USTA) seriously limits the nature of the analysis that can be performed by other parties, thereby precluding a full consideration of the many empirical issues raised by the Commission in the FFNRPM.

Moreover, the new "simplified" Christensen/USTA study suffers from many of the same fundamental errors made in the original study which render the study unacceptable from the standpoint of criteria nos. (1) and (2). Specifically, the "simplified" study, as did the original study:

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2. FFNPRM, para. 16.

- fails to consider productivity growth applicable for jurisdictionally *interstate* services, instead providing only a total company TFP result;
- uses a short-term post-divestiture input price data series<sup>3</sup> in calculating TFP, but a long-term pre-and post-divestiture input price series for calculating the input price differential, resulting in the erroneous assumption that LEC input price growth is identical to economywide input price growth;
- fails to recognize or make hedonic adjustments in the measurement of the capital input to reflect changes in quality and/or capacity of inputs, resulting in an overstatement of LEC input price growth for the capital input vis-a-vis the US economy as a whole;
- uses a cost of capital that fails to reflect the expected rate of return for the LECs;
- uses a rental price formula that fails to reflect the debt/equity distinction under the US tax code;
- uses depreciation rates that are not applicable to the telecommunications plant used by the LECs and that are based upon a much earlier time period than the post-divestiture time period of Christensen's study; and
- derives output quantities using a deflated revenue approach that relies upon seemingly flawed output price indices, instead of utilizing output measures based upon direct physical quantities.

The combined effect of these errors is a gross understatement of the productivity offset appropriate for LEC interstate telephone services. Christensen's "simplified" study produces an X-factor result of only 2.8%.<sup>4</sup> By comparison, in our earlier report we calculate a corrected X-factor (including input price differential and consumer productivity dividend) for jurisdictionally interstate services of 9.9%.<sup>5</sup> In this report, we overlay corrections of the various deficiencies that have been described above to Christensen's "simplified" study (at least for the 1989 to 1994 time period), and show that, when corrected, the X-factor results for the "simplified" Christensen study are, similar to the original study, in the range of 8% to 9% for jurisdictionally interstate services. Perhaps most telling of all, five of the seven

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3. Indeed, the "simplified" study truncates the study period even further to reflect only five years of post-divestiture data.

4. Christensen "simplified" study, p. 32.

5. ETI Report, *Establishing the X-Factor for the FCC Long-term LEC Price Cap Plan*, p. 55.

## *Introduction and Summary*

RBOCs have voluntarily selected and been operating under a 5.3% X-factor, the highest of the three X-factor levels adopted in the Commission's *First Report and Order*, and an X-factor that is almost double the paltry 2.8% X-factor currently being recommended by USTA.

Because of the serious errors that remain uncorrected in the new "simplified" study, as we discussed in our earlier report, it would be incorrect for the Commission to adopt the moving average approach being recommended by USTA (as opposed to an explicit LEC performance review) as a means of updating a TFP-based X-factor. The complex issues surrounding the calculation of a TFP-based X-factor, as discussed in this report and in the reports of other economic experts, are not likely to be fully resolved in the near term because of data limitations. Accordingly, they do not lend themselves to a mechanical annual updating process such as envisioned under USTA's proposal.

Similarly, because of the difficulties in correctly calculating a TFP-based X-factor, USTA's moving average proposal is not an effective substitute for either the consumer productivity dividend or sharing components of the LEC price cap plan. These components remain essential to protecting consumers against misspecification of the X-factor and ensuring that consumers benefit directly from incentive regulation, and accordingly should be retained. Sharing also can serve the purpose, as it has under the Commission's interim rules, of encouraging LECs to voluntarily select the highest possible X-factor, but the levels of X-factors being offered to the LEC must be significantly increased to levels in the range presented in this report.

## 2 | EVALUATION OF CHRISTENSEN/ USTA'S "SIMPLIFIED" METHOD OF CALCULATING TFP

**The new Christensen "simplified" study contains several fundamental errors which, unless corrected, will result in a gross understatement of the productivity offset appropriate for interstate telephone services.**

The new Christensen "simplified" study differs from the original Christensen study primarily in the data used to calculate LEC inputs. In particular, the "simplified" study relies upon publicly available data, whereas the original studies relied upon proprietary, internally-generated LEC data that was neither disclosed nor capable of independent replication. However, in most major respects, the "simplified" study employs fundamentally the same study methodology as the original and, accordingly, suffers from many of the same fundamental errors. These errors include:

- the failure to consider jurisdictionally *interstate* productivity, instead providing only a total company TFP study;
- the use of a short-term post-divestiture input price data series (indeed, one that is truncated relative to the original study) in calculating TFP, but a long-term pre-and post-divestiture input price series for calculating the input price differential, resulting in the erroneous assumption of a zero input price differential;
- the failure to make hedonic adjustments in the measurement of the capital input to reflect changes in quality and/or capacity, resulting in an overstatement of LEC input price growth for the capital input vis-a-vis the US economy as a whole;
- the use of a cost of capital that fails to reflect the expected rate of return for the LECs;
- the use of a rental price formula that fails to reflect the debt/equity distinction under the US tax code;



- the use of depreciation rates that are not applicable to the LECs and are based on a much earlier time period than the post-divestiture time period of Christensen's study; and
- the derivation of output quantities using a deflated revenue approach which relies on seemingly flawed output price indices, instead of output measures based upon direct physical quantities.

### **Interstate versus Total Company TFP**

USTA and most of the individual LECs argue in their filings that an interstate-only productivity measure is not economically meaningful. According to USTA, "jurisdiction is a political distinction only" and "[a]rbitrary regulatory boundary lines have no economic meaning or basis with regard to the input or output components of the production function."<sup>6</sup> In addition, in response to Commission concerns that "reliance on total company TFP data to set price caps for interstate rates would be inappropriate if state commissions continue to regulate within their jurisdiction on the basis of solely intrastate data," USTA argues curtly that "state regulation of rates should not be a determining factor for the federal price cap plan."

### **Contrary to claims by USTA and the LECs, an interstate-only TFP measure is economically meaningful.**

The position that an interstate productivity measure is not economically meaningful is simply not supported by the evidence in this proceeding. As ETI discussed in our earlier report,<sup>7</sup> it has long been recognized that cost, demand growth, and other pertinent conditions facing LECs may differ as between the interstate and state jurisdictions due to differences in the rate of demand growth for individual services, differences in the input mix for individual services, and the disproportionate presence of highly capital-intensive, switched services in the interstate jurisdiction.

The fact that output growth for interstate services has differed substantially from intrastate services is uncontroverted. Indeed, NYNEX, in its own comments, acknowledges

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6. USTA Comments, pp. 28-30.

7. ETI Report, pp. 46-47.